

28 April 2017

620.10512.00800 Flagstone Stage 1I RTN 20170419.docx

Peet Flagstone City Pty Ltd
Level 2, 167 Eagle Street
Brisbane QLD 4000

Attention: Nick Karimi

Dear Nick

**Flagstone City Development
Stage 1I
Road Traffic Noise Assessment**

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Peet Flagstone City Pty Ltd (Peet) to conduct an assessment of road traffic noise for Stage 1I of the proposed Flagstone City Development.

The road traffic noise assessment has been undertaken with regard to the *Queensland Development Code – Buildings in a Transport Noise Corridor* (QDC MP4.4). In summary the assessment has concluded:

- Where low set dwellings are constructed, 16 lots are likely to require Category 2 property treatments and 5 lots are likely to require Category 1 property treatments.
- As high-set property constructions, this would increase to 17 lots likely to require Category 2 property treatments and 11 lots likely to require Category 1 property treatments.
- It is to be noted that the shape and form of individual buildings has not been advised at time of writing, and as such these buildings, which could screen road traffic noise, are not included in the noise model. In this regard the noise predictions are considered a conservative assessment of road traffic noise.
- It is recommended that further assessment is undertaken once the building design is known to confirm QDC MP4.4 construction requirements. The enclosed report details the road traffic assessment methodology, predicted QDC MP4.4 noise categories and recommended building components for the applicable noise category.

Should you have any questions, or require additional assistance, please contact the undersigned via the details provided.

Yours sincerely



LUKE ZOONTJENS
Principal - Acoustics

Checked/SH Authorised by: LZ

QDC MP4.4 ACCEPTABLE FORMS OF BUILDING CONSTRUCTION

1 Introduction

In 2012, SLR has carried out an acoustic assessment¹ for the Flagstone City Development Project (the Project); however refinement of the proposed lot configurations for Stage 1I has taken place warranting revision of the road traffic noise assessment.

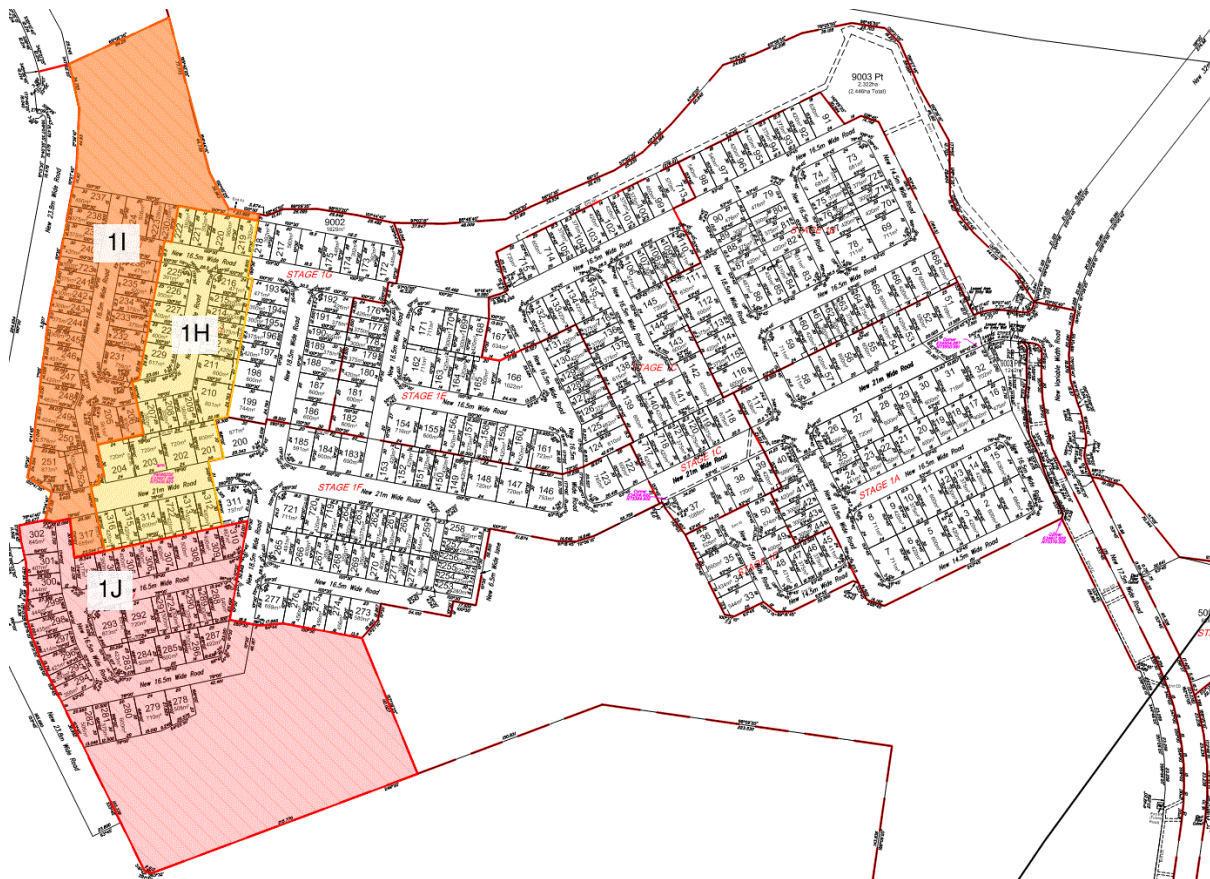
The findings of the original acoustic assessment determined that noise from the Sydney to Brisbane rail line, to the east of the Project, would achieve the relevant rail noise criteria throughout Stage 1I. The Flagstone Sewage Treatment Plant (STP) is located at least 900 m from Stage 1I and noise emissions from the STP would achieve the assessment criteria at the proposed lots in Stage 1I.

In this regard, further consideration of noise from the rail Line and the STP has not been required for this assessment.

2 Development Description

The subject site is the centre of the city of Greater Flagstone and will incorporate the main city centre for the region located next to the existing Sydney to Brisbane Line (future integrated transport site for passenger bus and rail). The general lot configuration of Stage 1I, within the Flagstone City Development, is shown on **Figure 1**.

Figure 1 Lot Configurations relative to other development stages



Note Not to scale.

Road traffic noise assessments undertaken to date have assumed all roads within the Flagstone City Development would be designated as either State-controlled or designated local government roads.

¹ SLR Consulting Australia , 2012. Flagstone Development Noise Assessment, document 620.10512-R1, dated 13 August 2012.

3 Road Traffic Noise Categories

Residential buildings within a Transport Noise Corridor for State-controlled roads or designated local government roads are to be designed and constructed in accordance with the *Queensland Development Code – Buildings in a Transport Noise Corridor* (QDC MP4.4). It is noteworthy that QDC MP4.4 applies only at the building approval and construction phase.

The noise reduction performance to be achieved through the various components of a proposed residential dwelling is measured in terms of the R_w value. The minimum R_w values to be achieved for each component of the buildings external envelope, for each of the QDC MP4.4 noise categories, are shown in **Table 1**. Note there are no lots predicted to be Noise Category 2, 3 or 4.

Table 1 QDC MP4.4 Noise Category Levels and Minimum Noise Reduction Performance for Building Components

Noise Category	Transport Noise Level ¹ for State-Controlled Roads, dBA (LA10(18hour))	Minimum Transport Noise Reduction For Habitable Rooms, dB	Building External Envelope Component	Minimum R_w required for each component	
4	≥73	40	Glazing	43	
			External Walls	52	
			Roof	45	
			Floors	51	
			Entry doors	35	
3	68 – 72	35	Glazing	38	where total area of glazing for a habitable room is greater than 1.8m ²
				35	where total area of glazing for a habitable room is less than or equal to than 1.8m ²
			External walls	47	
			Roof	41	
			Floors	45	
			Entry doors	33	
2	63 – 67	30	Glazing	35	where total area of glazing for a habitable room is greater than 1.8m ²
				32	where total area of glazing for a habitable room is less than or equal to than 1.8m ²
			External walls	41	
			Roof	38	
			Floors	45	
			Entry doors	33	
1	58 – 62	25	Glazing	27	where total area of glazing for a habitable room is greater than 1.8m ²
				24	where total area of glazing for a habitable room is less than or equal to than 1.8m ²
			External walls	35	
			Roof	35	
			Entry doors	28	
0	≤ 57	No additional acoustic treatment required – standard building assessment provisions apply.			

Note Transport noise is assessed at 1 m from the façade of the proposed or existing building.

4 Assessment of Road Traffic Noise

4.1 Methodology

The road traffic noise assessment methodology for Stage 11 of the Project is identical to that detailed in the original acoustic assessment in 2012. The current assessment incorporates the most recent lot configuration as well as updated 3-D topography of the local terrain.

Additional notes on the application of MP4.4 to this project

QDC MP4.4 provides noise categories based on road traffic noise levels forecast 1 m from the facade of a building. The higher the noise category, the more substantial the acoustic design and construction requirements will be in order to achieve an acceptable amenity within the residence.

Consistent with the 2012 noise assessment, noise barriers have not been included in the designed to mitigate road traffic noise as they are not considered to be in-line with the Flagstone City Development design requirements. Alternative mitigation methods such as building treatments are to be investigated as the preferred option.

QDC MP4.4 provides acceptable forms of construction to achieve the minimum R_w performance for each component of the building's external envelope. Those constructions have been reproduced in **Appendix B**.

It is noted that for construction purposes, where more than one noise category for a common facade is triggered, a consistent construction detail for a building component based upon the higher required R_w performance should be used.

It is acceptable to use materials other than those presented in QDC MP4.4 with manufacturer's specifications that, in combination, achieve the minimum R_w value for the relevant building component and applicable noise category.

It may also be possible to further refine the QDC MP4.4 accepted forms of constructions based on the actual building dimensions, preferred construction materials, and the predicted noise levels based on the methodology contained within Australian Standard 3671:1989 *Acoustics – Road traffic noise intrusion – Building siting and construction* (AS 3671).

It is highly likely that an alternative solution (to adopting the QDC MP4.4 noise category/constructions) will result in a reduced R_w requirement and subsequently a reduced construction cost to the applicant/developer.

4.2 Assessment

Year 2051 road traffic noise levels for Stage 11 of the Project have been predicted with regards to the QDC MP4.4 noise categories. The QDC MP4.4 noise category for each residential lot is detailed in the following table and figures:

- **Figure 2** presents the noise categories calculated at 1.8 m above pad level for low-set dwellings,
- **Figure 3** presents the noise categories calculated at 4.6 m above pad level for high-set dwellings.

The building design and construction of the dwellings was not known at the time of the assessment, as such the noise model did not take into account potential road traffic noise shielding from future residential buildings within the development.

It is recommended that dwellings proposed to be built on lots located behind developed lots more exposed to the road network undergo further assessment to confirm if a lower noise category is applicable and therefore a reduction in QDC MP4.4 construction requirements.

Table 2 Predicted QDC MP4.4 Noise Category at each Lot - Stage 1I

Lot	QDC MP4.4 Noise Category	
	Low Set Dwelling	High Set Dwelling
205	1	1
206	-	1
223	-	1
224	-	1
230	-	-
231	1	1
232	1	1
233	-	1
234	-	1
235	-	1
236	-	1
237	2	2
238	2	2
239	2	2
240	2	2
241	2	2
242	2	2
243	2	2
244	2	2
245	2	2
246	2	2
247	2	2
248	2	2
249	2	2
250	2	2
251	2	2
252	1	2
317	1	1
723	2	2

Note: '-' refers to Category 0.

Figure 2 Noise Categories Calculated at 1.8 m above Pad Level for Low-Set Dwellings

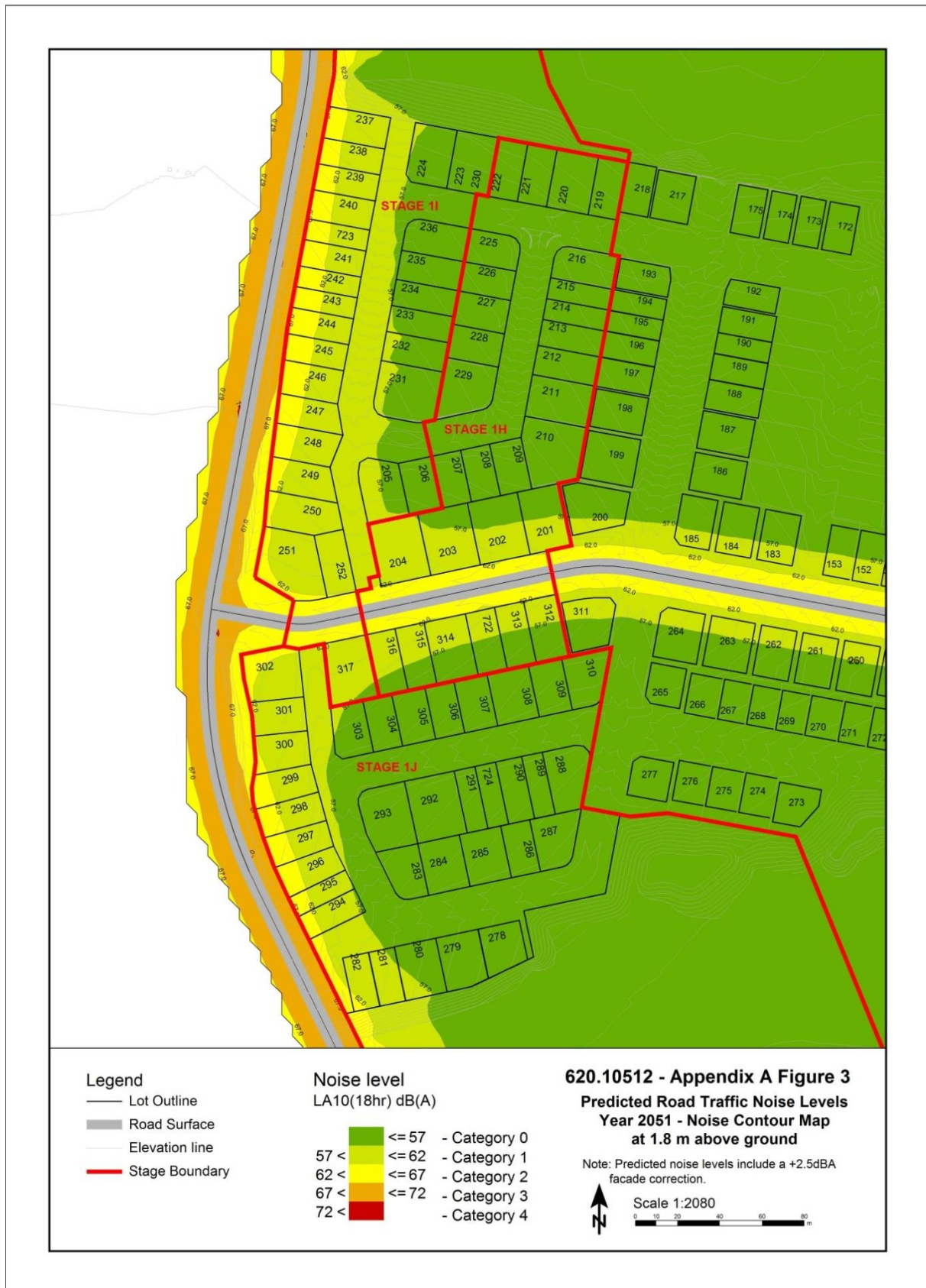
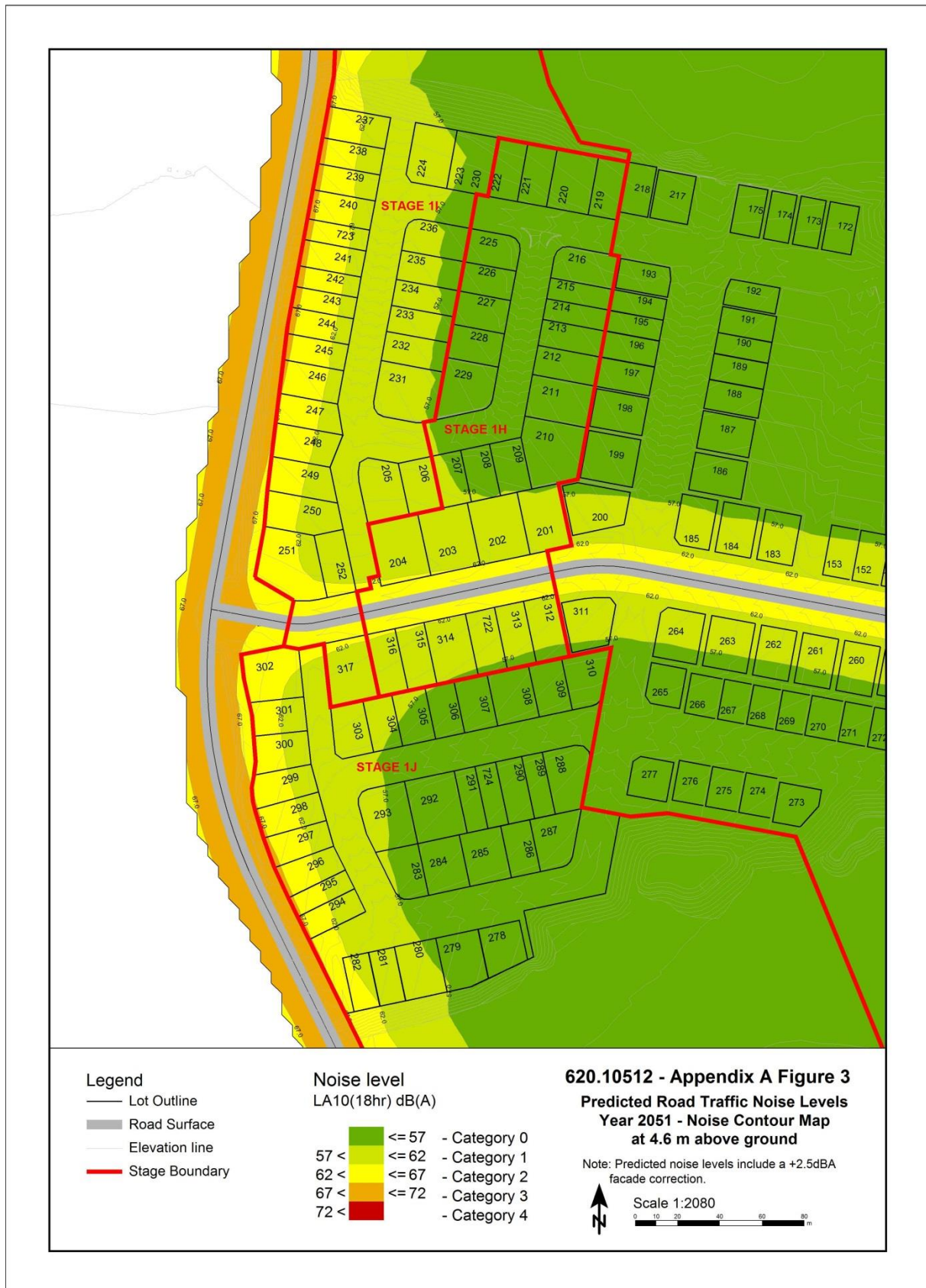


Figure 3 Noise Categories Calculated at 4.6 m above Pad Level for High-Set Dwellings



5 Conclusions

This report describes the results of a road traffic noise assessment undertaken for Stage 1I of the proposed Flagstone City Development in accordance with the QDC MP4.4.

The Flagstone City Development 3D SoundPLAN noise model was updated, with provided final lot configurations to predict the road traffic noise levels at the site for the planning horizon (year 2051) traffic volumes.

Based on the noise modelling, the predicted noise levels and the subsequent corresponding noise categories at the future development lots have been identified. The minimum noise reduction performance of each building component for the noise categories have been presented in **Table 1**.

Examples of acceptable forms of construction for the building components as described in QDC MP4.4 are shown in **Appendix B**. It is acknowledged that other acceptable forms of construction, which may result in reduced construction costs, could be determined using AS 3671.

At this stage of the development, the shape and form of residential dwellings is unknown and therefore building structures are not included in the noise model. Consequently, it is recommended that dwellings proposed to be built on lots located behind developed lots more exposed to the road network undergo further assessment to confirm if a lower noise category is applicable and therefore a reduction in QDC MP4.4 construction requirements.

QDC MP4.4 ACCEPTABLE FORMS OF BUILDING CONSTRUCTION

Schedule 2

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter <i>acoustically rated seals</i> .
	38	Minimum 14.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> ; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter <i>acoustically rated seals</i>
	35	Minimum 10.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> .
	32	Minimum 6.38mm thick laminated glass with full perimeter <i>acoustically rated seals</i> .
	27	Minimum 4mm thick glass with full perimeter <i>acoustically rated seals</i>
	24	Minimum 4mm thick glass with standard weather seals

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators.
	47	Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m ³ or 50mm thick polyester insulation with a density of 20kg/m ³ in the cavity. OR Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) at least 13mm thick cement render on each face OR Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m ³ positioned between studs; and (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. OR Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	41	<p>Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves</p> <p>OR</p> <p>Single leaf of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs <p>OR</p> <p>Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face</p> <p>OR</p> <p>Concrete brickwork at least 110mm thick</p> <p>OR</p> <p>In-situ concrete at least 100mm thick</p> <p>OR</p> <p>Precast concrete at least 100mm thick and without joints.</p>

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	35	<p>Single leaf of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs <p>OR</p> <p>Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.</p>
Roof	45	<p>Concrete or terracotta tile or sheet metal roof with sarking, <i>acoustically rated plasterboard</i> ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m³ in the cavity.</p> <p>OR</p> <p>Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of <i>acoustically rated plasterboard</i> at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity.</p>
	41	<p>Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity.</p> <p>OR</p> <p>Concrete suspended slab at least 100mm thick.</p>
	38	<p>Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³.</p>